

SECTION 1: INTRODUCTION

1.1 Purpose of the Survey

Origin-destination (O-D) surveys provide a detailed picture of the trip patterns and travel choices of a city's or region's residents. These surveys collect valuable data related to households, individuals and trips. This information allows stakeholders to understand travel patterns and characteristics; measure trends; provide input to travel demand model development, forecasting, and planning for area-wide transportation infrastructure needs and services; and, monitor progress in implementing transportation policies.

Since the late 1970s, the TRANS Committee has coordinated travel data collection in the National Capital Region (NCR). TRANS is a multi-agency transportation planning committee serving the NCR. Its member agencies comprise the City of Ottawa, OC Transpo, the Ministry of Transportation of Ontario (MTO), the National Capital Commission, the Ville de Gatineau, the Société de Transport de l'Outaouais (STO) and the Ministère des Transports du Québec (MTQ). More information about TRANS and its data, modelling and planning activities can be found at www.ncr-trans-rcn.ca.

TRANS plays a significant role in managing the region's O-D surveys, notably including the 1986, 1995 and 2005 studies. In 2011, the TRANS Committee commissioned R.A. Malatest & Associates Ltd. in association with HDR Inc. and David Kriger Consultants Inc. to conduct the latest iteration of the study. The *2011 NCR Household Origin-Destination Survey* was funded by the City of Ottawa, OC Transpo, the Ville de Gatineau, STO, MTO and MTQ.

Alone and when combined with other types of data (e.g., travel time surveys, traffic counts, on-board transit ridership counts, demographic and employment data), the 2011 O-D survey is the most recent tool for the measurement of changing transportation behaviour in the region. The survey provides valuable and reliable information on current conditions and trends in local travel. It also will support an update of the TRANS Committee's regional travel demand forecasting model.

1.2 Purpose of the Report

This report summarizes the results of the *2011 NCR Household Origin-Destination Survey*. The findings are presented in tabular and graphical format, providing details for the entire survey area and for 26 sub-areas that are referred to as TRANS Districts. Information collected by the survey and presented in this report includes broad socio-demographic and travel characteristics as well as detailed information about trip purpose, mode choice and trip distribution. The 2011 report maintains consistency with the *2005 NCR Household Origin-Destination Survey* report, while allowing additional tabulations and enhanced presentations of data.

This report reflects the expanded survey results. Survey data were subjected to rigorous editing, imputation, expansion and validation processes prior to their tabulation and summary.

1.3 Organization of the Report

This report comprises six sections. Sections 1 and 2 provide an introduction and an overview of the survey method and process.¹ Section 3 compares the 2011 O-D survey results with those of previous NCR surveys and surveys elsewhere in Canada. Section 4 presents key findings from the survey for the region as a whole. Section 5 presents detailed characteristics for the 26 districts as well as for six larger municipal and transit areas in Ontario and Québec and for the entire survey area. Finally, Section 6 presents summary origin-destination matrices for the 26 districts.

One appendix accompanies the report: **Appendix A** contains a copy of the 2011 survey questionnaire.

1.4 Glossary

The following is a glossary of key terms and their meaning as applied in the *2011 NCR Household Origin-Destination Survey* and to this report.

Basic terms: The glossary begins with some basic definitions. Many of the terms are related to each other. Accordingly, the terms are arranged to allow a progression of the explanation and, as such, are not necessarily in alphabetical order:

- Weekday travel refers to all trips made over the course of a working weekday during autumn 2011. Trips were captured on any of the five weekdays, so long as these were not public holidays.
- Origin is the location where a trip begins. It is described in terms of a street address, a monument (e.g., a well-known location, an office building, a school, etc.), a street intersection or a district. All survey origins have been geo-coded for precision. Each origin has also been assigned a zone number (see below), to support the application of the survey data for travel demand modelling and forecasting.
- Destination is the location where a trip ends. It has similar attributes as the trip origin.
- Origin-destination describes both 'ends' of a single trip. This term is commonly abbreviated to 'O-D.'
- Zone is a small-area geography that divides the NCR spatially. The zones, also known as transportation analysis zones (TAZs), are used for modelling. There are currently 701 TAZs, including 29 external zones outside the NCR's boundaries. Zones are similar in concept to the *Census of Canada's* Census Tracts; however, their boundaries are determined in large part by land use as opposed to the Census' basis in population. For the purposes of the survey sampling and the reporting of the survey results, the NCR's zones have been aggregated into 26 unique districts, which cover the entire NCR.

Demographic terms are presented below:

- Household is the basic analytical unit of the survey sample. It corresponds to a group of people, whether related or unrelated, who live together in the same location.

¹ Reports describing the method and execution of the 2011 O-D survey were developed separately for the TRANS Committee. These reports provide a detailed account of all processes involved in the completion of this study, including staffing, training, call centre management, sampling, data coding, cleaning, validation and expansion.

- Population refers to the residents of the NCR. Note that a differentiation is made among 'total population' (meaning, all age groups); '5+' (meaning, only the population whose trips were recorded – that is, people 5 years of age and older – given that young children do not generally travel independently); and '11+' (meaning people 11 years of age and older). Whereas previous surveys included only people 11 years of age and older, the 2011 survey included people 5 years of age and older. The change allows for a more accurate depiction of the travel behaviour of younger children and the older people who accompany them.
- Employed or working population refers to residents who identified themselves as having a full or part time job. This is a measure of where employed people live. In contrast, employment or jobs refers to the count of jobs at the workplace. Note that the two descriptions of workers are not necessarily comparable: The employed / working population is derived from survey responses, hence is consistent with the other demographic data that are collected in the survey. The employment / job data are collected through different sources at different times in Ottawa and the Outaouais. For more information, see Section 4.3.
- Telecommuter refers to an employed individual whose usual workplace is located outside the home but who happened to be working from home on the travel day surveyed (and not travelling to work or for any work-related purpose that day). In contrast, for the purposes of this survey, this definition excludes persons whose usual workplace is the home. Note that in all cases, the worker's usual place of work is identified, so the distinction between telecommuters and those who work out of the home is further clarified.
- Vehicle availability represents the number of motor vehicles that are available for use by the household, as identified by the survey respondent, regardless of who actually owns the vehicle (e.g., a company car). Only vehicles that are licensed for use on public roads are included in this tabulation. The category includes light trucks and small vans in addition to automobiles. Motorcycles / scooters and recreational vehicles (RVs) are excluded.

Trip characteristics: The next several terms describe the composition of a trip. Again, these are presented to convey the meaning and so are not necessarily arranged in alphabetical order.

- Trip or person trip is a single or one-directional movement of one person from one point (origin) to a second point (destination), for a single purpose. For example, the commute from home to work represents one trip. The purpose of this trip is to go to work. However, if the commuter stopped along the way to drop off a child at a daycare, then two trips have been made: first, for the purpose of 'serving a passenger' (pick up or drop off) and then to go to work. A single trip can comprise one or more modes, and one or more transfers; for example, the commuter might have driven to a Transitway station, where she parked the vehicle at a 'Park and Ride' lot, and then taken the bus to her workplace.

The O-D survey is household-based and as such focussed on the movement of *people*. Accordingly it did not capture commercial trips (that is, trips that are made to move *goods* or to provide *services*).²

- Modes describe the types of transportation services that are used by residents in the region. For the purposes of the survey, they include: auto driver, auto passenger (as

² The trip made by a service person from his/her home to the first call of the day is recorded in the survey as a home-to-work trip.

distinct from the driver), public transit (bus or light rail), paratransit, school bus, motorcycle, taxi, walking and cycling. ‘Other’ is used to capture trips made by NCR residents on ferry, boat, VIA Rail or air – that is, modes whose use is quite small relative to that of the other modes. Note that, for the purposes of some analyses in this report, some modes may be grouped together.

- Primary mode identifies the ‘dominant’ mode in the case of a trip with multiple modes, and is used to simplify the analysis. For example, in a trip involving both urban transit and auto (e.g., a park-and-ride trip), urban transit is considered the primary mode.

Table 1-1 lists the modes and their hierarchy in descending order. Urban transit is at the top of the hierarchy – meaning that in a trip involving both urban transit and auto driver (i.e., park and ride), urban transit is considered to be the primary mode. Note that the order in which the modes are used is immaterial to this hierarchy.

The urban mode that likely had the longest trip distance in any combination is considered next as dominant. For example, a child might be taken by auto to a designated bus stop, followed by a longer trip via school bus, hence school bus has the priority. Intercity modes are further down the list because, in the case of multiple modes, the trip by an urban mode is considered to have the primary impact on travel within the NCR (e.g., an auto passenger trip to the airport has a greater impact on local transportation planning needs than the trip via airplane). Note that walk is considered a mode only if it used for the entire trip: i.e., the walk trip to the bus stop is not identified separately (here, mode equals ‘urban transit’), but the walk trip to the restaurant for lunch is a separate trip.

Table 1-1: List of Modes and their Hierarchy, and Groups Used for Most Reporting

Hierarchy (primary mode)	Mode	Grouping for Reporting
1.	Urban transit (OC Transpo, STO and/or O-Train)	Urban Transit
2.	School bus (yellow bus)	Other Modes
3.	Paratransit	Other Modes
4.	Other bus and minibus	Urban Transit
5.	Auto driver	Auto driver
6.	Auto passenger	Auto passenger
7.	Motorcycle / scooter	Other Modes
8.	Taxi	Other Modes
9.	Bicycle	Bicycle
10.	Ferry	Other Modes
11.	VIA Rail train	Other Modes
12.	Intercity or chartered bus	Other Modes
13.	Airplane	Other Modes
14.	Other (not otherwise noted above)	Other Modes
15.	Walk (entire trip)	Walk (entire trip)

- Modal share is the proportion of trips by any given mode out of the total trips by all modes, for a given time period.
 - Modal split is the proportion of trips by a given motorized mode out of the total trips by common motorized modes (auto driver, auto passenger, urban transit), for a given time period. Excludes less common motorized modes (taxi, motorcycle/scooter, school bus, paratransit), non-motorized modes (walking, bicycle) and other, atypical modes (passenger train, airplane, water taxi).
- Trip purpose describes the reason that the trip is made. **Table 1-2** lists the twelve unique trip purposes used in the survey, with ‘other’ added to capture trip purposes not otherwise identified.

Table 1-2: Trip Purpose

Purpose
1. Travel to work
2. Work-related (i.e., going somewhere outside one’s normal place of work to conduct business)
3. Working on the road (i.e., outside a single fixed place of work)
4. Travel to school
5. Shopping trips or trips for household maintenance
6. Restaurant (i.e., for a meal)
7. Recreation (e.g., going to the theatre)
8. Visit friends or family
9. Health and personal care (e.g., going to the doctor’s office)
10. Drive someone (i.e., dropping someone off – e.g., taking a child to a daycare)
11. Pick up someone (e.g., picking up the child from the daycare)
12. Return home (from any activity)
13. Other purpose (not otherwise identified)

Note that the commute from home to work is categorized as a ‘work’ trip, whereas the return trip from work to home (which may simply be the same trip on the same mode in the reverse direction) is categorized as ‘return home.’

- Trip chain is the sequence of trips that starts and ends at home. For example: home to work to shopping to home comprises a single chain that has three elements. If the same traveller subsequently leaves home to go shopping and then to the gym (home to shopping to leisure to home), then this constitutes his second trip chain on that day – in this case, a chain that has four elements. Note that the sequence of trips within a chain is important – that is, the same elements of a chain in different orders constitute different chains. In the methodological discussion in Chapter 2, a ‘full 24-hour trip chain’ refers to all of the trips reported for a person for the entire travel day.

- Internal trips describe trips for which origin *and* destination are both located in the same district. External trips refer to those trips that start *or* end (but not both) in the same district.
- Time of day refers to the period during which trips are made:
 - Daily refers to the 24-hour period between 04:00 the day of the surveyed activities and 03:59 of the following morning. The 4:00 AM start and end time is used commonly in travel surveys as a reasonable demarcation of a day's travel, because very little activity occurs at that time. This timing also allows the survey to complete, as much as possible, the trip chains for which the return home happened after midnight.
 - Peak periods are the times of day when the transportation system (both road and transit) typically carries the maximum number of trips, according to their start time. The morning (AM) peak period has been determined as trips starting between 6:30 and 8:59. The afternoon (PM) peak period corresponds to trips starting between 15:30 and 17:59.³
 - Peak hours are the hours within the respective morning and afternoon peak periods that have the highest concentration of trips, according to their start time. In this report, the AM peak hour is between 07:15 and 08:14 a.m. and the PM peak hour is between 16:00 and 16:59.
- Vehicle kilometres travelled (VKT) represents the total number of kilometres travelled on the roads within the survey area by all vehicles in a period (in this case, the full 24-hour survey period). VKT is a commonly used measure of activity. Distances travelled are based on the primary mode (in cases of multiple modes used in a trip) and are derived from the TRANS travel demand forecasting model. This is explained in more detail in Section 4.12.

1.5 Acknowledgements

The *2011 NCR Household Origin-Destination Survey* was commissioned by the TRANS Committee and conducted by R.A. Malatest & Associates Ltd. in association with HDR Inc. and David Kriger Consultants Inc.

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³ The 2½ hour duration and the start and end times of the AM and PM peak periods have been used in the NCR for several years. As part of this study, the consultant reviewed the data, and determined that there was no need to change either the start and end times or the 2½ hour duration. However, as travel volumes and people's travel behaviour changes over time, and in light of evolving conditions in other Canadian cities, TRANS may wish to continue monitoring these times and durations in the future. Note that this concept of peak-period is established mainly for reporting: detailed information about trip start times can be found in the survey database.

This report was prepared by David Kriger (David Kriger Consultants Inc.), Carole Chartrand and Andreas Rose (R. A. Malatest & Associates Ltd.), with tabulations and other input provided by Don Cleghorn, Kevin Shen and Tara Erwin (HDR Inc.).

The successful completion of this project would not be possible without the contributions of over 26,000 households that agreed to participate in this research. Approximately 1 in every 20 households in the region completed survey interviews and told us about their daily travel. To those individuals who participated: our sincerest gratitude for their contribution to a fundamental source of data that will be used for transportation planning for years to come.